

# Optimize Wireless Networks for Data

Identifying Resource Usage  
and Managing Network  
Performance with the  
Alcatel-Lucent 9900  
Wireless Network Guardian



# Enabling the Wireless IP Transformation

End users around the world are quickly adopting the blended lifestyle made possible by accessible and affordable communications that allow them to blur the lines between work, home life and entertainment. To support that lifestyle, end users are subscribing to services they can easily adapt and personalize to their needs on whatever communications device they choose.

Wireless broadband data services are an important part of the blended lifestyle equation. They allow end users to not only place calls and access the Internet with their wireless devices, but also connect with their office networks over secure links, download music and videos, and take advantage of a host of location-based services that give them access to home, work and entertainment from anywhere and at any time.

Fueling this evolution in communication are new IP-enabled cell phones and laptop air cards that, when combined with new data pricing plans, have made using wireless broadband data services more affordable. As a result, wireless service providers worldwide are beginning to experience measurable subscriber uptake for these services. The wireless IP transformation is here and now.

But while all this is good news from a business perspective, the increase in data traffic is creating concerns about how IP packet data affects wireless networks. Since IP applications were not designed for transmission over a wireless infrastructure, it is no surprise that some of these applications consume significant amounts of resources in the wireless network. In addition to bandwidth, these

applications consume signaling, radio frequency (RF) channels, airtime, and backhaul resources. The performance of wireless IP networks is intimately coupled to the types of applications the network transports, and in a complex way.

To accommodate the IP load, and enable resilient and robust delivery of emerging applications, wireless service providers need complete visibility of how every behavior and flow — resolved to individual devices and servers — places load on the network. This is a paradigm shift in how IP networks are currently built. This new visibility means the service provider can effectively optimize their wireless networks to deliver the continuously evolving list of applications.

## Identify Resource Usage and Manage the Network

The Alcatel-Lucent 9900 Wireless Network Guardian (WNG) offers powerful capabilities for monitoring 2.5G, 3G and 4G wireless data networks. It identifies wireless network resource usage and allows you to better manage network performance. And it allows you to protect your networks from degraded performance and outages that can arise from transmitting wireless-unfriendly IP traffic.

This advanced wireless network monitoring product provides detailed information about how every subscriber, application, server, and flow creates actual load on your wireless data network, and delivers alerts about any behaviors that have an anomalous impact on network performance and capacity.



*"There is no shortage of tools on the market that provide traffic analysis for wireless operators. Much less common, however, are tools that go beyond simply identifying traffic types or usage and provide visibility into the impact of that traffic on network performance. Most people believe that going forward — as 3G takes hold and 4G gets launched — nobody can predict which applications will drive mobile broadband uptake. If so, tools such as Alcatel-Lucent's 9900 WNG will be critical for ensuring that operators can not only head off network threats but also incent applications that make the most efficient use of network resources."*

PETER JARICH, RESEARCH DIRECTOR, CURRENT ANALYSIS

By connecting individual subscribers to resource consumption, the Alcatel-Lucent 9900 WNG helps you manage the effects that IP-based applications have on your wireless network. More importantly, it allows you to ensure you make the best possible use of your network and the precious air spectrum between the network and the mobile endpoints.

With the Alcatel-Lucent 9900 WNG you can:

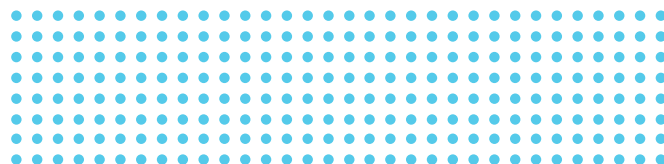
- Monitor both Internet-mobile and mobile-mobile traffic
- Access a real-time view of how a subscribers' usage (including intended, unintended, and malicious) translates to load across a wireless data network
- Identify anomalous usage behaviors as they relate to network performance and availability
- Identify which subscribers, servers, and applications are contributing to network loads when those loads exceed prescribed limits
- Perform surgical mitigation and network optimization via elements in the network
- Manage unwanted activity using bespoke mitigation strategies, and thereby improves network capacity utilization

## Track Behavior at the Subscriber and Network Level

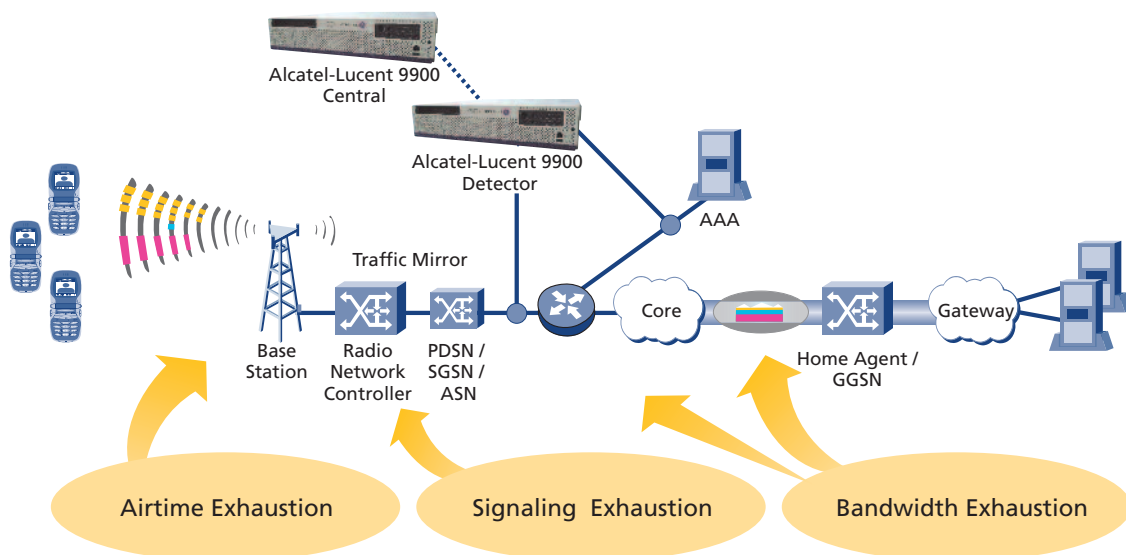
The Alcatel-Lucent 9900 WNG is offered with two components that allow you to monitor network behavior at the subscriber and network level (Figure 1).

The Alcatel-Lucent 9900 WNG Detector is deployed in the packet core on a mirrored port:

- Between the packet data serving node-HA (PDSN-HA) and PDSN-authentication, authorization and accounting (AAA) system (PDSN-AAA) in CDMA networks
- Between the serving general packet radio system (GPRS) support node (SGSN)-gateway GPRS support node (SGSN-GGSN) and SGSN-AAA in GPRS/UMTS networks
- Between the access service node-home agent (ASN-HA), ASN-AAA in WiMAX networks



**Figure 1. Alcatel-Lucent 9900 WNG Correlates Subscriber Traffic, Network Performance, and Behavioral Anomalies in One Solution**





The Alcatel-Lucent 9900 WNG Detector is:

- Based on a technology-leading 2RU-high 500mm deep server with integrated field programmable gate array (FPGA)-based network interfaces, and currently supports 2 million packets per second data, 1 million active sessions and 5 million concurrent flows
- Based on NEBS-3 platforms

In addition, the Alcatel-Lucent 9900 WNG supports multi-vendor wireless networks, and can simultaneously support multiple air-interface protocols.

The Alcatel-Lucent 9900 WNG Central is deployed in a network or security operations center, and receives event streams from all deployed Alcatel-Lucent 9900 WNG Detectors.

The Alcatel-Lucent 9900 WNG Central is:

- Based on a technology-leading server with integrated FPGA-based network interfaces, and currently supports a feed of 10,000 events per second, which typically translates to 10 Alcatel-Lucent 9900 WNG Detectors, depending on specific network conditions

- Depends only on the ingress data feeds from the Alcatel-Lucent 9900 WNG Detector, and does not rely on any other inbound feeds
- Provides simple network management protocol (SNMP) traps and SysLogs for interoperability with the existing network management or security event management systems

### **Leverage Comprehensive, Experienced Professional Services**

The Alcatel-Lucent Professional Services group can help your teams deploy the Alcatel-Lucent 9900 WNG so that you get maximum advantage from its capabilities. The services available include everything from performing installation and configuration to analyzing findings and recommending strategies to optimizing network resources and security controls.

Additionally, Alcatel-Lucent security assessment capabilities for wireless service providers are enhanced with the use of the Alcatel-Lucent 9900 WNG, and deliver more comprehensive wireless-specific insights that can help you protect your network and subscribers.

# Enhance End-to-End Business Operations

By deploying the Alcatel-Lucent 9900 WNG in your network you can enhance end-to-end business operations, from network performance to marketing.

## Improve Network Performance

All applications that run on IP networks are traditionally reduced to a single dimension — volume (or bandwidth). Quite simply, “data is data”. As wireless networks become more IP-like — both in terms of technology and how subscribers use those networks — experience suggests we can design, engineer, optimize, manage, and price the networks by this dimension, bandwidth.

This operating principle is fundamentally unsound in wireless IP networks. Two applications that may consume exactly the same bandwidth may have widely disproportionate impacts on other critical

resources in the network, such as airtime (Figure 2).

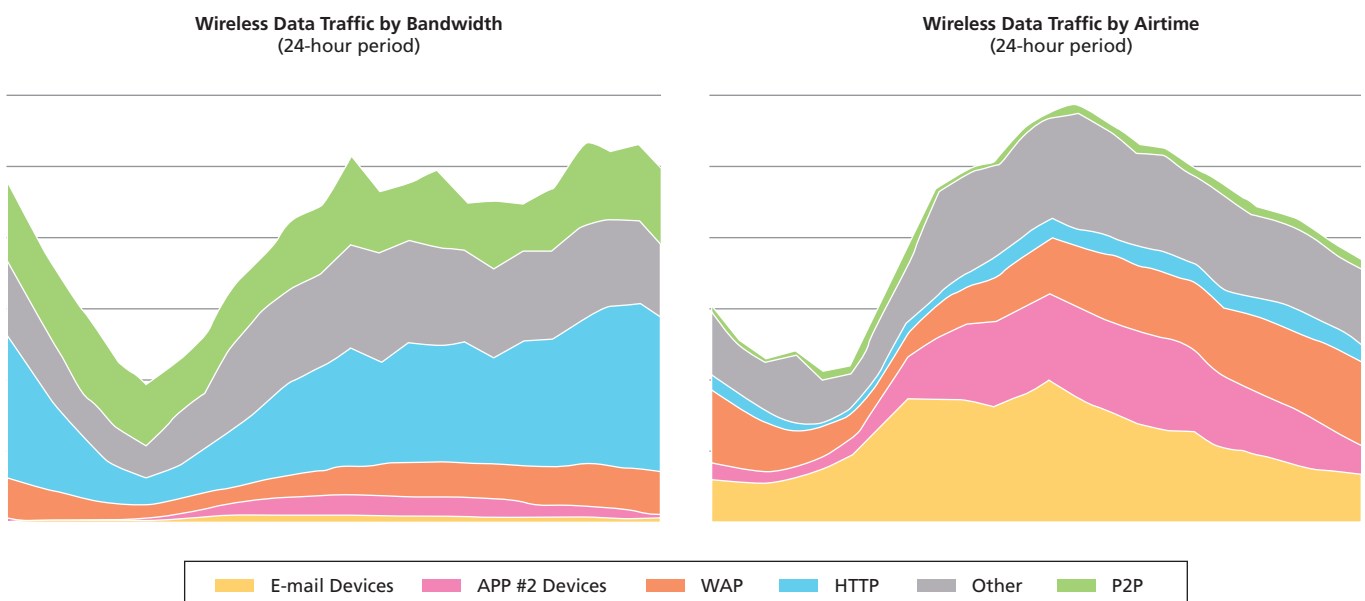
Every IP application that transmits over the wireless data network consumes many different resources in the network. Service providers need to still scale applications by bandwidth, but must also scale other resources, such as radio-access airtime, device-network signaling and base station channels.

Data is no longer “just data” on wireless IP networks. And that means to properly design, engineer, optimize, manage, price, and ultimately differentiate NGN Wireless IP networks, service providers must have never-before-required visibility into how packets and flows impact every constrained resource in the wireless network — from the packet core all the way down into the radio access network.

The Alcatel-Lucent 9900 WNG is the first product to market in a new product category, which enables wireless operators to operationally connect IP-layer behaviors to Wireless-layer impacts, and to optimize, manage, and build out their networks accordingly

In addition, an optional managed service component can relieve your network operations personnel of the burden of monitoring the network for performance-impacting events. This helps you defer or postpone costs associated with training and developing the subject matter experts required to leverage the forensic/root-cause analysis capability of the Alcatel-Lucent 9900 WNG and propose/implement mitigation policies.

Figure 2. Bandwidth and Airtime in Wireless IP networks





## Streamline Engineering and Planning

Network planning is based on average models of subscriber usage during busy hours. It assumes average load characteristics per subscriber. But each device, application, and subscriber can have highly differing and unpredictable impacts on the network.

The Alcatel-Lucent 9900 WNG helps engineering and planning teams see exactly how subscribers in any given region are using the network, so that the appropriate resources can be added or reallocated to accommodate the measured and specific subscriber activities.

Moreover, by providing detailed network usage information, the Alcatel-Lucent 9900 WNG helps engineering and planning teams understand actual usage patterns and perform a reasonable trending analysis that can be used to guard the network against any negative impacts caused by customer concentration on certain applications.

## Manage Security

Wireless security requirements are more challenging than wireline security because:

- Attacks can be waged on the network using extremely low volume traffic that masks as every day traffic (for example, without packet-specific signatures)
- Attacks can come from within the wireless data network and can leverage mobile-to-mobile communications without crossing a peering point (where IP security tools are often deployed)
- The IP address in the mobile world easily and constantly changes, so tracking potential attackers is a multi-step challenge

The Alcatel-Lucent 9900 WNG provides network security teams with tools specifically designed for wireless data networks that can help identify and manage threats and denials of service.

## Develop Targeted Marketing

Beyond network operation, planning and security, the Alcatel-Lucent 9900 WNG can also enhance marketing efforts that directly contribute to subscriber retention and reduce churn.

With the detailed network performance and subscriber information available from the Alcatel-Lucent 9900 WNG, marketing teams can get a better understanding of how much it costs the network to support every subscriber, every application, and every device type. With this information, marketers can determine an ROI for each existing and new service, based not only on the cost of the subsidized device or application royalties (if customer-hosted), but also the fundamental cost to the network.

As a result, you can choose devices and applications that enable maximum profitability for your market.



## Partner With the Networking Leader



Alcatel-Lucent has set the pace for change in communications networking technologies. We continue to innovate by combining what is possible in science and technology with what is required by the markets.

With one of the largest global R&D capabilities in the communications industry, as well as our renowned Bell Labs research community, we help bring our customers to the forefront of technical innovation every day.

Through our research facilities in 14 different countries we have invested more than \$3.6 billion in R&D and secured more than 25,000 patents.

The Bell Labs record for innovation is unmatched and includes development of transformational technologies such as the transistor, the laser,

the solar cell, HDTV, and remote laptop security solutions. No other vendor in the industry can match this depth and record of research and innovation.

Alcatel-Lucent Bell Labs has been pioneering work in the area of Wireless Behaviors Research. It is here where the harmonic balance between “always-on” applications and a “just-in-time” network became obvious.

Alcatel-Lucent Ventures, the new-business incubator for Alcatel-Lucent, moved fast to address the needs of global operators with Bell Labs Technology.

They built an internal startup charged with developing the first product aimed at closing this gap.

In less than twelve months, they’ve transformed years of research into the Alcatel-Lucent 9900 WNG.

Beyond research, Alcatel-Lucent recognizes that it takes the right combination of customer services, applications and infrastructure to successfully apply technical innovations that enable new business models that improve customer relationships, increase employee productivity and are more adaptive to changing markets.

As a proven telecom partner, we also bring our extensive experience in delivering large, multi-vendor, multi-technology solutions to organizations around the globe.

If you’re looking to optimize your wireless network to efficiently handle IP-based data traffic, look no further than the Alcatel-Lucent 9900 WNG. For more information, please visit [www.alcatel-lucent.com/wng](http://www.alcatel-lucent.com/wng).

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